



Dakota Skies

Spring 2003

www.crh.noaa.gov/bis

Severe Summer Weather Awareness Week April 28 through May 2

Prepare yourself- North Dakota Governor John Hoeven has designated the week of April 28 through May 2 as "Severe Summer Weather Awareness Week" in North Dakota. Take time now to prepare. Be sure you know what watches and warnings are, how to receive them, and what to do once they are issued by your NWS (National Weather Service). Familiarize yourself with the latest safety tips. Prepare now and be safe later.

Definitions- *Watch* means conditions are right in the atmosphere for severe weather to develop. Watch for sudden changes in the weather and be prepared to act quickly. Watches are issued for tornadoes, severe thunderstorms, and floods. They are usually valid for a long time (6 hours) and for a large area (half the state of North Dakota).

Warning means severe weather has been reported, or based on radar and other data, meteorologists at your National Weather Service believe it is occurring. Get to a safe shelter immediately if you are in the warned area. Warnings are issued for tornadoes, severe thunderstorms, and flash floods. They are usually issued for a short time (an hour or less) and for small areas (a county or smaller). Note that flash flood warnings are usually issued for several hours and for a few counties.

Funnel Cloud is a rotating column of air not in contact with the ground.

Tornado is a violently rotating column of air extending from a thunderstorm to the ground. A visible funnel is not needed.

Severe Thunderstorm is a thunderstorm that produces 58 mph (or higher) wind and/or 3/4" (or larger) diameter hail. Note that 3/4" diameter hail would be

just slightly larger than the size of a dime.

Safety- During a tornado get to a basement shelter. The best place is in the center of the basement under a sturdy workbench or under the stairway. If you do not have a basement, go to the center of the lowest level of the home and into a closet or bathroom with no windows. Put as many walls between you and the outside as possible. Stay away from windows. In a school or other large building, go to the lowest level and into a bathroom or a hallway near the center of the building. Stay away from windows! Stay away from large wide open rooms like an auditorium or gymnasium!

In an automobile in rural areas, move at right angles away from the tornado. As a last resort, leave the vehicle, get into a ditch, and cover your head. If in an automobile in a city or populated area, do not try to outrun the tornado. Get to a sturdy building.

Mobile homes are not safe in tornadoes! Abandon them for a permanent structure! (NEXT PAGE)

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Safety continued– Lightning is a killer! When thunderstorms are occurring...NO swimming...NO bath or shower...NO boating...NO golf...NO baseball or softball...NO lawn mowing. Stay away from railroad tracks, barbed wire fences, and hill tops. DO NOT stand under isolated trees. DO NOT be the tallest object. DO NOT use electrical appliances. Stay off the phone unless it is an emergency. If you can hear thunder, you are close enough to be struck by lightning. When thunderstorms are occurring GET INSIDE!

Floods and flash floods are the number one weather hazard. On average they kill 88 people each year in the United States, more than any other weather hazard. When thunderstorms are forecast DO NOT camp near canyons or dry creek beds. DO NOT drive or walk into flood waters. DO NOT allow children to play in a flooded street or near storm drains or culverts. Most flood deaths occur at night when it is harder to see the danger. If flood water starts collecting around you, abandon your vehicle and get to higher ground.

Did you know? Weather events cause \$11 Billion in damages annually in the United States and 1/3 of the United States economy (\$3.5 Trillion) is weather sensitive. The mission of your National Weather Service is to issue forecasts and warnings for the protection of life and property and the enhancement of the national economy. Working to help you protect yourself and your property is your National Weather Service.

Winter 2002-2003 Recap

Meteorological winter is defined as the months of December, January, and February. There were the typical warm spells and the typical bitterly cold ones. When looking at the three month period as a whole the warm spells almost cancelled the cold ones and North Dakotans experienced a near normal winter with regard to temperature. The moisture deficit continued through the season.

December was the warmest month. Temperatures averaged significantly above normal with Bismarck leading the way at 7.6 degrees above. Minot was a close second at 7.2 warmer than average. Precipitation offered mixed results in December with Williston and Dickinson reporting slightly above normal amounts, while Bismarck, Minot, and Jamestown recorded below average amounts.

As 2002 turned the page to 2003, temperatures were much closer to normal, albeit still on the plus side, while precipitation continued to fall short of normal everywhere except the Williston area. For the month of January, Jamestown was the driest, receiving only 20 percent of normal moisture. Minot received about half their normal amount. The weather pattern changed dramatically for February.

February brought a dose of harsh winter reality to the area, as it often does. Temperatures averaged significantly below normal. Williston was the coldest with February temperatures a whopping 9.5 degrees below normal. Minot and Jamestown were

close behind at 8.9 and 8.4 degrees below respectively. Precipitation was a clean sweep, all stations were below normal. Minot and Jamestown took the dry honors again with only half their normal amounts of moisture.

The lowest temperature of the season was 35 degrees below zero on February 24 in Williston, a record low for the city. On January 22 Bismarck recorded its first sub-zero high temperature in almost three years. The high that day in Bismarck was 4 below.

October 2002 was extremely cold, the third coldest on record in Bismarck. November was quite mild. March 2003 started off with intense cold. Temperatures the first 10 days of March were nearly 25 degrees below normal. Williston had record lows on five of the first eight days. There was a reversal to much above normal temperatures during the middle of the month, and the month ended up just below normal. Again, the warm nearly balanced the cold.

The meteorological winter of 2002-2003 in North Dakota will best be remembered for, well, not being remembered. When looking back on the season as a whole, although there were many warm spells and many harshly cold ones, temperatures averaged out close to normal. The warm and cold spells, as they sometimes do, almost cancelled each other. The precipitation deficit continued. *Story by Stephen H Keebler*

Long Range Summer Forecast

The Climate Prediction Center (CPC) of the National Weather Service forecasts near normal temperatures for the entire state of North Dakota for the summer of 2003. The CPC is also forecasting near normal precipitation amounts for the state and nearly the entire country.

This forecast was prepared on March 20, 2003, and is based in part on the dissipation of El Nino. El Nino has influenced weather patterns in the northern hemisphere over the past six months or so.

The forecast depicts equal chances for average temperatures for the Northern Plains during the months of June, July, and August, meteorological summer. For the southern tier of the United States, and both coasts, chances are better for above normal temperatures.

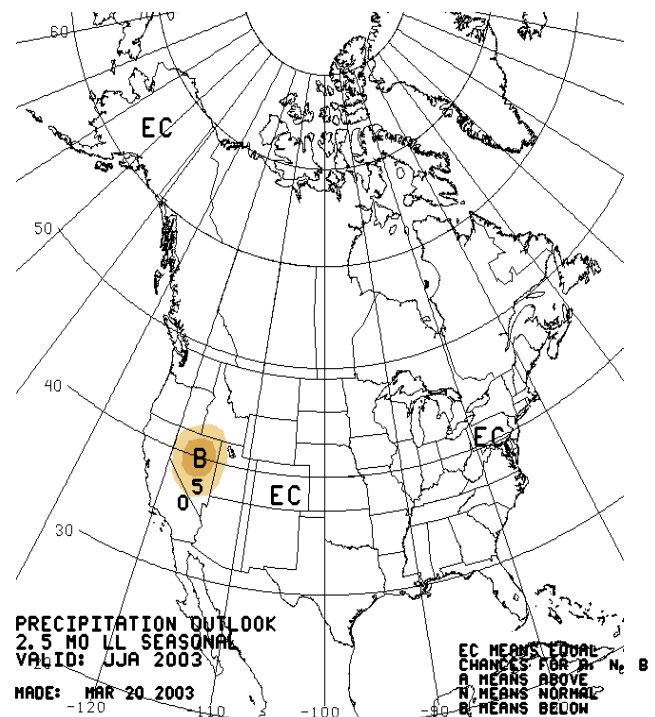
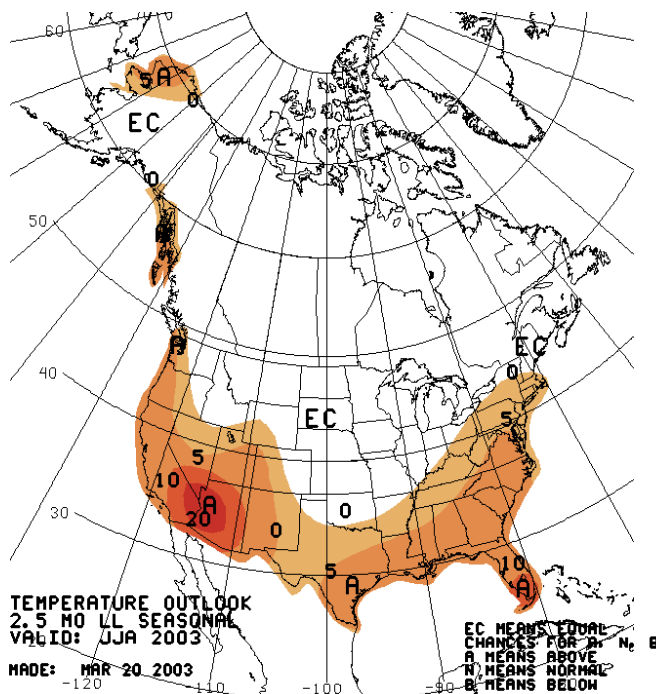
As far as precipitation, with the exception of Nevada and surrounding areas, there are equal chances for average precipitation during the summer.

North Dakota, as well as other areas in the Northern Plains, have been in a drought for nearly two years. In fact, precipitation has been below average for 17 of the past 19 months in Bismarck. Charlene Prindiville, Service Hydrologist with the National Weather Service in Bismarck, says people in the agriculture business stand to lose the most if the dry conditions persist.

June, July, and August are historically the wettest months for the area. If average amounts of rain are received it would be good news. Most would even say that a wet spring and summer would be even more beneficial.

The accuracy of long-term forecasting is still marginal at best, but there are some encouraging signs. The forecast for this past winter was fairly accurate. Many are hopeful that the forecast for normal amounts of rain this summer is also an accurate one.

Story by Stephen H Keebler



Map Legend-These maps show the likelihood, as a percentage, of temperature (left) and precipitation (right) varying from climatology. **A** indicates Above climatology, **B** indicates Below climatology, and **EC** indicates Equal Chances above and below. (June-July-August)

HWO - Hazardous Weather Outlook

The HWO is issued daily around 5 AM and is available on the Bismarck NWS homepage at www.crh.noaa.gov/bis. The purpose of this product is to discuss, in concise non-technical terms, weather hazards that are expected over the next seven days. Our hope is that this product will be helpful to weather spotters, emergency managers, the media, and the public. Check it out!



**Summer Officially Begins at
2:10 PM CDT on June 21, 2003**



**Fall Officially Begins at
5:47 AM CDT on September 23, 2003**

Weather Radio News

Listen to NWR (NOAA Weather Radio), the voice of your National Weather Service, on specially equipped radio receivers. Radios are commercially available. NWR is an “all hazards” system that keeps you up-to-date on any and all hazards, 24 hours a day, seven days a week.

NWR continues to expand through grant money made available through the RUS (Rural Utilities Service) of the USDA (United States Department of Agriculture). The private sector, usually electric and telecommunications cooperatives, in conjunction with the RUS-USDA, supply the needed funding to get new transmitters on-line. By participating in this program, the private sector is supplying a tremendous service to their customers. Contact NWS Bismarck for information.

Steele-Napoleon and Sheyenne are On-Line– BEK Communications of Steele has installed a new NWR transmitter in Kidder County, about mid way between Steele and Napoleon. The radio is on the air and transmitting at 162.400 MHz. An official recognition ceremony is planned for late April in Steele. Thanks to BEK for leading the way in providing weather radio coverage to parts of Kidder and Logan counties.

A new NWR transmitter is on the air at 162.525 MHz broadcasting from 6 miles southwest of Sheyenne, in Eddy County. Service extends into Foster and Wells counties. Thanks to Eddy County officials for taking the lead on providing this service.

Other Transmitters in the Works– NWR continues to expand across North Dakota. By mid-summer of this year, transmitters could be on-line near New Town in Mountrail County, Willow City in Bottineau County, and Rolla in Rolette County. Paperwork has begun on a site near Fort Ransom in Ransom County, and on a site near Scranton in Bowman County. Stay tuned for later information about these sites.

Weather Radios– Weather radios vary in price depending on features and quality. Radios are available that allow you to program the weather messages and locations that you want to be alerted for. Visit an electronics store for feature, pricing, and quality details.

Radio Coverage– The next page has details on weather radio transmitters and the areas that are served by them. County code numbers are provided for programmable radios. Contact NWS if you need more information.

NOAA Weather Radio Transmitters and County Coverage

SAME (Specific Area Message Encoding) codes for western and central North Dakota counties begin with 038

* means the county is within good weather radio signal coverage and tone alerts for warnings should be received

Williston Transmitter WXL-84 at 162.550 MHz 1000 Watts (Located 12 miles west of Williston in Williams County)

Divide *	038023	Williams *	038105	McKenzie *	038053
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Minot Transmitter WXL-83 at 162.400 MHz 1000 Watts (Located 13 miles southwest of Minot in Ward County)

Burke	038013	Bottineau	038009	McHenry *	038049
Mountrail	038061	Rolette	038079	Pierce	038069
Renville *	038075	Ward *	038101	McLean *	038055

Dickinson Transmitter WXL-80 at 162.400 MHz 1000 Watts (Located 12 miles southwest of Dickinson in Stark County)

southern Dunn *	038025	eastern Slope *	038087	Bowman	038011
Golden Valley	038033	Hettinger *	038041	Adams	038001
Billings *	038007				

Bismarck Transmitter WXL-78 at 162.475 MHz 1000 Watts (Located near St. Anthony in Morton County)

Mercer	038057	Emmons *	038029	Sheridan	038083
Oliver *	038065	Burleigh *	038015	Wells	038103
Morton *	038059	Sioux *	038085	Kidder	038043
Grant *	038037				

Kidder County Transmitter WNG-581 at 162.400 MHz 300 Watts (Located about mid way between Steele and Napoleon in Kidder County)

Kidder *	038043	northern Emmons *	038029	southeastern Burleigh *	038015
northwestern Logan *	038047	western Stutsman *	038093		

Jamestown Transmitter WXL-81 at 162.550 MHz 1000 Watts (Located 2 miles east of Ypsilanti in Stutsman County)

southern Foster	038031	northwestern LaMoure *	038045	Logan	038047
Stutsman *	038093	McIntosh	038051		
western Barnes *	038003	Dickey	038021		

Sheyenne Transmitter KWN-46 at 162.525 MHz 1000 Watts (Located 6 miles southwest of Sheyenne in Eddy County)

Foster *	038031	Wells *	038103
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Baker, MT Transmitter WXX-57 at 162.550 MHz 300 Watts (Located 7 miles southwest of Baker, Montana)

western Slope	038087	western Bowman	038011
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(signal strength in North Dakota is unknown at this time-operated by National Weather Service Billings)

Lowry, SD Transmitter WXM-40 at 162.500 MHz 1000 Watts (Located in southern Walworth County)

southern Emmons	038029	southern McIntosh	038051
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(signal strength in North Dakota is unknown at this time-operated by National Weather Service Aberdeen)

Firesteel, SD Transmitter WNG-551 at 162.425 MHz 1000 Watts (Located in northwest Dewey County)

Sioux	038085
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(signal strength in North Dakota is unknown at this time-operated by National Weather Service Aberdeen)

Aberdeen, SD Transmitter WXM-25 at 162.475 MHz 1000 Watts (Located in northern Brown County)

Dickey *	038021
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(signal strength in North Dakota is unknown at this time-operated by National Weather Service Aberdeen)

Glendive, MT Transmitter at 162.475 MHz

Golden Valley	038033
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(signal strength in North Dakota is unknown at this time-operated by National Weather Service Billings)

Plentywood, MT Transmitter at 162.475 MHz

Divide	038023
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(signal strength in North Dakota is unknown at this time-operated by National Weather Service Glasgow)

Too Hot for Thunderstorms?

Growing up we were taught that hot and humid weather resulted in thunderstorm development. Why is it then that some of the steamiest days do not produce thunderstorms?

A thunderstorm forms when sufficient amounts of moisture, lift, and instability are present. Moisture reaches North Dakota on southerly winds that bring high humidity air into the state from the deep south and Gulf of Mexico. You might describe humid days as “sticky”. The lift is supplied by advancing frontal boundaries, low pressure systems, and disturbances moving through at various levels of the atmosphere. These provide the lift needed to get moist parcels of air rising. Instability is present when a parcel of air, after given a lift upward, remains warmer than the air surrounding it and continues to rise. In this case the atmosphere is “unstable”. If that parcel, after being lifted up, is colder than the air around it, it will sink back down and the atmosphere is “stable”.

A rising parcel of air will cool at a nearly fixed rate. Generally speaking, temperatures decrease as you go up in the atmosphere. So, the parcel is cooling as it rises, as the air around it is also getting colder. The key is that the parcel, although cooling off, must remain warmer than the air around it. If it does remain warmer than the air around it, the result may very well be the formation of thunderstorms.

On hot days, when temperatures at the ground are in the 90s or even higher, the atmosphere is usually also heating up and may be “warm” relative to what its temperature is normally. A parcel that begins rising will encounter this warmer air and may very well be cooler than the air around it. The parcel sinks and no thunderstorms form.

For thunderstorms to develop, a moist parcel needs to be lifted in an unstable environment. If this parcel keeps rising a thunderstorm may form.

It is also possible that “warmer” air is moving in at the middle and upper levels of the atmosphere. In this case, a rising parcel may again be colder than the air surrounding it and the result would be that the parcel sinks back toward the earth. In this case, again, no storms. This scenario where the atmosphere is just “too warm” is referred to as a capping inversion or “cap”. A cap will cause the parcels of air to sink back

toward the earth without forming into a storm. This can happen even if there are ample amounts of moisture and lift. These capping inversions often occur between 5,000 and 10,000 feet above the ground on some of the hottest days of the summer. A cap can be the main reason a storm does not form, even when it is hot and humid. It just might be “too hot” at some level of the atmosphere for thunderstorms!

Meteorologists use data from weather balloons, surface observations, numerical models, and satellites to determine if a capping inversion is present. While it is true that a cap suppresses thunderstorm development, it also helps to build up the instability and potential of the atmosphere by keeping this warmer air trapped between two colder layers. If the cap can be eroded or “broken”, thunderstorm development can be sudden and explosive.

The best way for you to find out if moisture, lift, and instability are present, and if thunderstorms will develop today, is to check out the HWO (Hazardous Weather Outlook) issued by the Bismarck National Weather Service around 5:00 AM each morning. The product can be found on the Bismarck NWS website at <http://www.crh.noaa.gov/bis> and is broadcast on NOAA Weather Radio as conditions warrant.

Story by Chauncy J Schultz



Summer 2002 Review

The first summer SEVERE weather report was 0.75 inch diameter hail (just over dime size) on April 16 at Surrey in Ward County.

The largest hail stone reported was 4.5 inch diameter (softball size) on June 8 and fell 5 miles north of Sentinel Butte in Golden Valley County.

The highest thunderstorm wind speed was 80 mph measured at Garrison in McLean County on August 8.

The last report of SEVERE weather came from Dickey County on September 18. It was 1.75 inch diameter hail (golf ball size) that fell 11 miles west of Merricourt.

In 2002 there were seven tornadoes in the Bismarck NWS County Warning Area (western and central North Dakota). There were 150 reports of large hail (0.75 inch diameter or larger), 79 reports of damaging wind, and 10 floods and flash floods. The seven tornadoes:

June 23	Burleigh County	F0
June 23	McHenry County	F1
June 25	Rolette County	F0
July 9	Ward County	F0
July 9	McIntosh County	F0
July 24	Stark County	F0
August 11	Stutsman County	F4

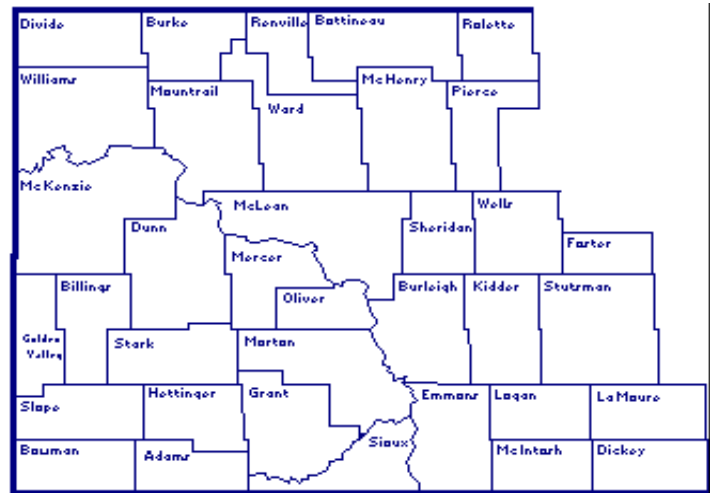
11 August 2002 Stutsman County F4 tornado about 5 miles NE of Medina

Photo by Joe Heupel sent to NWS by Darrell Graf



Summer Heat Safety

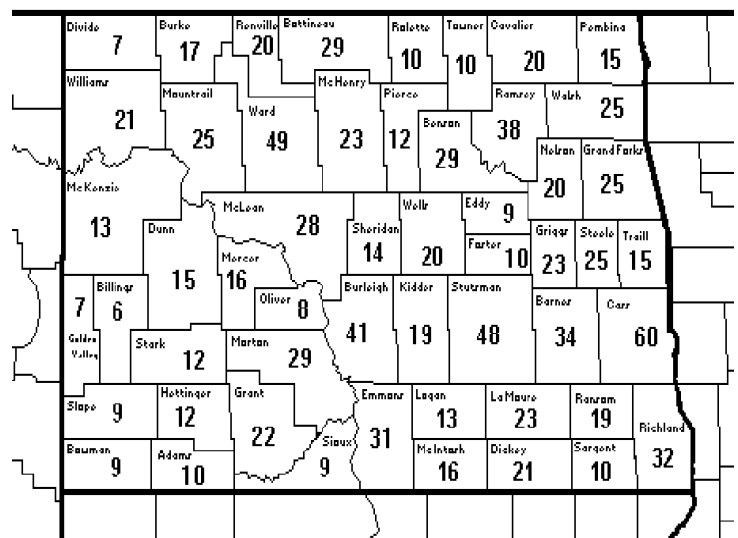
When it gets hot, slow down, take frequent breaks, and drink plenty of water and other non-alcoholic liquids. Avoid being out in the sun for too long. Dress in lightweight, light-colored clothes. The NWS will issue a heat advisory for a heat index of 105-114 expected to last three hours or more. The NWS will issue an excessive heat warning for a heat index of 115 or higher expected to last three hours or more.



CWA (County Warning Area) Map for
National Weather Service Bismarck

This is a map of the area of responsibility of the NWS Bismarck office. NWS Bismarck is responsible for issuing forecasts and warnings for western and central North Dakota. We have 23 employees and the office is staffed 24 hours a day, seven days a week, year round.

Number of Tornadoes reported 1950-2002



About this Publication

Dakota Skies is published twice each year, in the spring and in the fall, by the WCM at your National Weather Service Forecast Office in Bismarck, North Dakota. The purpose of this publication is to heighten awareness about safety for the coming severe weather season, whether it be summer or winter, and to relay information to you on any changes at your Bismarck National Weather Service. Additionally, other educational and useful information will be provided as space allows. If you have any comments or suggestions about *Dakota Skies*, feel free to contact the Bismarck NWS.

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